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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PETER J. DITZEL and SRIKANTH KOTTILINGAM

Appeal 2009-009954
Application 10/679,080
Technology Center 1700

Decided: December 22, 2009

Before ROMULO H. DELMENDO, JEFFREY T. SMITH, and BEVERLY A. FRANKLIN, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1-4, 7-9, 12, and 15-22 (Appeal Brief filed March 10, 2008, as revised on February 9, 2009, hereinafter "App. Br.," at 2; Final Office Action mailed October 9, 2007). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

STATEMENT OF THE CASE

Appellants' claimed invention relates to a consumable insert, which is commonly known as "[a] material that is melted and reformed as part of a joint between two work pieces during [a] welding or brazing process" (Specification, hereinafter "Spec.," 1, ll. 4-9). According to Appellants, "[t]he consumable material may typically include a melting point depressant such as boron or silicon to ensure that the consumable material will melt at a temperature that does not risk melting of the work piece" (Spec. 1, ll. 26-29). In transient liquid phase bonding of superalloys, the consumable insert may be formed of nickel into which boron melting point depressant is diffused (Spec. 2, ll. 1-3). Appellants discovered that incomplete melting of prior art consumable inserts in transient liquid phase bonding may be caused by the distribution of the melting point depressant (Spec. 2, ll. 15-19). To solve this problem, Appellants state that they "developed a consumable insert having a concentration of a melting point depressant that is greater proximate a center region of the insert than proximate an exterior surface region of the insert" (Spec. 2, l. 31 to 3, l. 1). As an alternative embodiment, Appellants also claim a consumable insert, which is suitable for "applications involving the deposition of non-ductile materials," comprising a specified sheath and particles of MCrAlY alloys[1] (Spec. 5, l. 11 to 6, l. 7).

Claims 1, 7, 15, and 22 read as follows:

> 1. A consumable insert foil comprising a metal-comprising material and melting point depressant material, the melting point depressant material comprising nickel-boron having a concentration that is greater proximate a center region of the consumable insert foil than proximate an exterior surface region of the consumable insert foil.
>
> 7. A consumable insert comprising:
> a sheath having a desired ribbon shape; and
> particles of an MCrAlY alloy material exhibiting a ductility of less than 18% tensile elongation contained by the sheath.
>
> 15. A method of transient liquid phase bonding using a consumable insert, the method comprising:
> forming a consumable insert comprising a metal-comprising material and melting point depressant material, the melting point depressant material having a melting point depressant concentration that is greater proximate a center region of the insert than proximate an exterior surface region of the insert;
> capturing the consumable insert between two work pieces to be joined by transient liquid phase bonding;
> heating the work pieces and the consumable insert to a temperature sufficiently high to melt the consumable insert; and
> maintaining the temperature sufficiently high for the melting point depressant to diffuse into the work pieces to an

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[1] The Specification explains that "MCrAlY refers to the known family of alloys where M in the alloy is usually selected from the group of nickel, cobalt and iron or alloys thereof, and Y in the alloy is usually selected from the group of yttrium, lanthanum and hafnium" (Spec. 5, ll. 15-17).

extent sufficient for the consumable insert to solidify to form a joint between the work pieces,

wherein forming the consumable insert further comprises:

depositing particles of the melting point depressant into a hollow center of a tube of sheath material; and

flattening the tube into a ribbon shape having the particles of the melting point depressant in the center region and having the sheath material in the exterior surface region.

22. A method of material deposition utilizing a consumable insert, the method comprising:

providing a consumable insert comprising a sheath formed to a desired ribbon shape and particles of an MCrAlY alloy material contained by the sheath; and

melting the insert onto a surface of a work piece; and

allowing the melt to cool to form a coating.

(Br. 14, 15, and 17; Claims App'x.)

The Examiner relied upon the following as evidence of unpatentability (Examiner's Answer mailed May 29, 2008, hereinafter "Ans.," 3 and 7):

Kear	4,250,229	Feb. 10, 1981
Ryan	4,700,881	Oct. 20, 1987
Bampton	5,289,967	Mar. 1, 1994
Sabol	6,060,174	May 9, 2000
Allnatt	6,193,930 B1	Feb. 27, 2001
Burke	6,508,000 B2	Jan. 21, 2003

The Examiner rejected the claims as follows:[2]

I. Claims 1-4 under 35 U.S.C. § 112, second paragraph, as indefinite (Ans. 4);

II. Claims 1-4 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement (Ans. 3-4);

III. Claims 1-4 under 35 U.S.C. § 102(b) as anticipated by Ryan (Ans. 4-5);

IV. Claims 7-9 and 12 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Ryan and Sabol (Ans. 5);

V. Claims 15-21 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Ryan and Bampton (Ans. 5-6); and

VI. Claim 22 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Ryan, Bampton, and Sabol (Ans. 6-7).

ISSUES

I. Claims 1-4: Indefiniteness

The Examiner asserted that the limitation "the melting point depressant material comprising nickel-boron," as recited in claim 1, lacks clarity because it does not correspond to "[t]he [S]pecification [which] distinctly characterizes boron as the only component constituting the melting point depressant" (Ans. 4 and 8).

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[2] In the Examiner's Answer, the Examiner withdrew the final rejection of claim 1 under 35 U.S.C. § 102(b) over United States Patent 6,098,871 to Cairo (Ans. 3).

Appellants, on the other hand, contend that the limitation in question can be fully understood in view of the Specification disclosure at page 4, lines 17-22, which describes that the consumable insert may be heat treated to "encourage some diffusion of the melting point depressant . . . into the sheath" (Br. 5-6) and that "[s]uch heat treatment *may* create a chemical bond" (emphasis added) between the sheath material and the melting point depressant material (Spec. 4, ll. 20-22).

Thus, the dispositive issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown reversible error in the Examiner's finding, which underlies the indefiniteness conclusion as to claim 1, that "[t]he [S]pecification distinctly characterizes boron as the only component constituting the melting point depressant"? (Ans. 8.)

II. Claims 1-4: Lack of Written Description

For reasons similar to those advanced in Rejection I above, the Examiner asserted that claim 1, which was amended post-filing to recite "the melting point depressant material comprising nickel-boron," violates the written description requirement of 35 U.S.C. § 112, ¶ 1 (Ans. 3-4).

Appellants contend that the limitation in question is supported by the original disclosure in the Specification at page 4, lines 17-22 (Br. 5).

Thus, a dispositive issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown reversible error in the Examiner's finding that the disclosure, as originally filed, did not reasonably convey to one skilled in the relevant art that Appellants had possession of the invention now recited in claim 1, including the limitation "the melting point depressant material comprising nickel-boron"?

III. Claims 1-4: Anticipation over Ryan

The Examiner found that Ryan discloses every limitation of claim 1 (Ans. 4-5). Specifically, the Examiner found that Ryan discloses a consumable insert comprising a stack of two foils, each foil comprising a nickel-based material with boronized surfaces, wherein the center of the stack of the two foils has a greater concentration of melting point depressant material relative to certain other portions of the composite stack including regions adjacent or near the exterior surfaces of the stack (i.e., consumable insert foil) (Ans. 4-5 and 8-9).

Appellants, on the other hand, contend that Ryan's stacked foils "do not anticipate claims 1-4 because the *concentration* of boron in the stack is the *same* in the upper, middle and bottom regions" (Br. 7).

Thus, the sole issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown error in the Examiner's finding that Ryan describes a consumable insert foil comprising a melting point depressant material "having a concentration that is greater proximate a center region of the consumable insert foil than proximate an exterior surface region of the consumable insert foil," as recited in claim 1?

IV. Claims 7-9 and 12: Obviousness over Ryan and Sabol

The Examiner acknowledged that Ryan does not disclose MCrAlY alloy material as recited in claim 7 (Ans. 5). To account for the MCrAlY material, the Examiner relied on Sabol, which teaches a basecoat including a MCrAlY alloy for protecting substrates (e.g., turbine substrates) (*id.* at 9). The Examiner then concluded that it would have been obvious to one of ordinary skill in the art to incorporate the MCrAlY alloy material described in Sabol into Ryan's consumable insert to "obtain [a] high quality joint at low cost" (*id.* at 5).

Appellants, on the other hand, contend that the Examiner erred because there is "no basis for why one skilled in the art would combine the teachings of Sabol regarding sprayed protective surface coatings into the teachings of Ryan regarding consumable inserts for joining two metals" (Br. 8).

Thus the issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown error in the Examiner's obviousness conclusion because the Examiner failed to identify a sufficient reason as to why a person of ordinary skill in the art would have combined Ryan and Sabol?

V. Claims 15-21: Obviousness over Ryan and Bampton

With respect to the steps defining the “forming [of] the consumable insert” in the method claims 15, 18, and 19, the Examiner asserted that the “shaping of the insert provides no contribution to the diffusion process which seems to be the central issue governing the claimed bonding process” (Ans. 10).

Appellants, on the other hand, assert that the combined teachings of Ryan and Bampton do not disclose: (i) the flattening of a tube (claims 15-17); (ii) the flattening of a U-shaped plate (i.e., “forming the U-shaped plate into a tube; and flattening the tube”) (claim 18); or (iii) the flattening of upper and lower plates together to a desired thickness after depositing particles therebetween (claims 19-21) (Br. 10).

Thus, the issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown error in the Examiner’s rejection because it did not properly account for the contested limitations in claims 15, 18, and 19?

VI. Claim 22: Obviousness over Ryan, Bampton, and Sabol

The dispositive issue arising from the contentions of the Examiner and Appellants is the same as in Rejection IV.

FINDINGS OF FACT ("FF")

1. Appellants' Figure 2 is reproduced below:

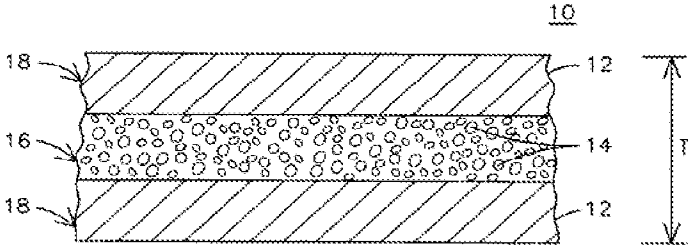

FIG. 2

Figure 2 depicts one embodiment of the invention in which a "[c]onsumable insert 10 is formed as a sheath 12 filled with particles of a melting point depressant 14" (Spec. 3, ll. 1-3).

2. Appellants' Specification discloses that "[t]he concentration of the melting point depressant 14 is greater proximate the center region 16 of the insert 10 than proximate the exterior surface regions 18 of the insert" (Spec. 3, ll. 3-5; fig. 2).

3. Appellants' disclosure, as originally filed, describes embodiments of the invention as follows (Spec. 4, ll. 17-27; emphasis added):

> A diffusion heat treatment *may* be applied to the consumable insert 10 in conjunction with the mechanical flattening processes described above in order to *encourage* some diffusion of the melting point depressant material 14 into the sheath material 12. Such heat treatment *may* create a chemical bond between the sheath material 12 and some of the particles 14, such as forming *nickel-boron* for applications of a nickel sheath 12 and a boron melting point depressant 14. . . . A desired cross-section and *distribution of melting point depressant may be achieved* by judicious selection of the original

> dimensions of the sheath material 12, the quantity of particles 14 used, the mechanical rolling/flattening processes used, and the optional heat treatment regiment selected.

4. After the filing of the Application, Appellants amended claim 1 to include the limitation "the melting point depressant material comprising nickel-boron," as recited in appealed claim 1 (Amendment submitted July 21, 2006).
5. The Examiner did not produce evidence demonstrating that the melting point depressant that has diffused into the sheath and has formed nickel-boron would not be a melting point depressant or that nickel-boron cannot include a melting point depressant such as unreacted boron.
6. Burke, Allnatt, Kear, and Ryan do not teach that boron is the only material that possesses melting point depressant characteristics, but instead Kear, for example, teaches that boron is exemplary (Burke, col. 5, ll. 27-35; Allnatt, col. 1, ll. 10-20; Kear, col. 3, l. 64 to col. 4, l. 5; and Ryan, col. 3, ll. 21-23).
7. Ryan's Figure 4 depicts an assembly of multiple foils between articles being joined during the initial stages of a transient liquid bonding process (col. 2, ll. 10-14).
8. Ryan's Figure 4 is reproduced below:

FIG. 4

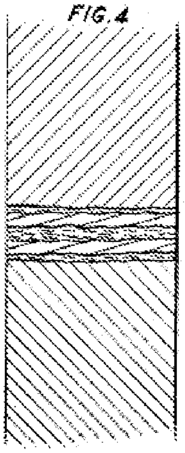

Figure 4 depicts an assembly comprising two foils, wherein the boronized surfaces of the two foils are melted at (i) the exterior portions of the assembly (adjacent the articles being joined) and (ii) the interface of the two foils (i.e., the boron-rich zone at center of the assembly) (col. 1, ll. 53-62).

9. Ryan's Figure 4 discloses two volume regions, wherein the region extending from the center comprises the adjacent boronized surfaces of the two foils, and the region extending from the exterior surface includes two sub-regions (i.e., one sub-region comprising the boronized surface portion and one sub-region comprising the base composition of the foil).

10. Ryan does not disclose an insert comprising MCrAlY alloy material.

11. Sabol discloses an improved MCrAlY-type basecoat including boron for protecting substrates (e.g., turbine substrates), wherein the M component is nickel (col. 1, ll. 8-10; col. 2, ll. 7-48; col. 3, ll. 55-58).

12. Sabol discloses that the MCrAlY basecoats "hav[e] outstanding adherence to a substrate, high density, offer[] superior protection in hostile thermal environments, and allow[] decreased production costs" (col. 2, ll. 8-11).

PRINCIPLES OF LAW

"The legal standard for definiteness is whether a claim reasonably apprises those of skill in the art of its scope." *In re Warmerdam*, 33 F.3d 1354, 1361 (Fed. Cir. 1994).

To satisfy the written description requirement of 35 U.S.C. § 112, first paragraph, the disclosure of the application as originally filed must reasonably convey to those skilled in the relevant art that the applicants, as of the filing date of the original application, had possession of the claimed invention. *In re Alton*, 76 F.3d 1168, 1172 (Fed. Cir. 1996).

The subject matter of the claims need not be described identically or literally to satisfy the written description requirement of 35 U.S.C. § 112, first paragraph. *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983).

"[T]he PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

"To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

The Supreme Court of the United States explained that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). "Although common sense directs one to look with care at a patent application that claims . . . the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill . . . to combine the elements in the way the claimed new invention does." *Id.* Also, while the Supreme Court warned against "[r]igid preventative rules that deny factfinders recourse to common sense," it stated that the "factfinder should be aware . . . of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning." *Id.* at 421.

ANALYSIS

I. Rejection of Claims 1-4 under 35 U.S.C. § 112, ¶ 2

We agree with Appellants that the Examiner erred. The Examiner argues that "[t]he [S]pecification distinctly characterizes boron as the only component constituting the melting point depressant" and that claim 1 does not correspond to, or is inconsistent with, such disclosure (Ans. 8). This argument, however, is not supported by factual evidence. Indeed, the portion of the Specification (upon which Appellants base their arguments) discusses the key claim term "nickel-boron" in the context of boron melting point depressant material that has diffused into nickel upon *optional* heat treatment, which encourages diffusion and *may* also form a reaction product between nickel and boron (FF 3). Reading the relied-upon portion of the

Specification in context as a whole, one skilled in the relevant art would have also understood that the finally-produced consumable insert would have a "distribution of melting point depressant" (FF 3). Contrary to the Examiner's belief, the original disclosure of the Specification plainly discloses that the region of the consumable insert that contains diffused boron includes the melting point depressant.

Given the enlightenment found in the original Specification, we find no persuasive reasoning why the contested claim limitation ("melting point depressant material comprising nickel-boron") would have rendered the scope of claim 1 indefinite. While it appears that the Examiner believes that boron is "the only component constituting the melting point depressant" (Ans. 8), the Examiner failed to produce any evidence demonstrating that "nickel-boron" is not a "melting point depressant" or that "melting point depressant" cannot encompass an admixture of a material that is in fact a melting point depressant and a material that may or may not be a melting point depressant (FF 5). And, contrary to the Examiner's belief (Ans. 7), the cited portions of Kear, Allnatt, Burke, and Ryan do not establish that boron is the only possible component constituting the melting point depressant (FF 6). Consistent with the Specification disclosure at page 1, lines 26-29, Kear suggests that the "melting point depressant" can be selected from a material other than boron (FF 6).

For these reasons, we cannot uphold the Examiner's stated rejection.

II. Rejection of Claims 1-4: Lack of Written Description

We agree with Appellants that the Examiner's rejection is not well-founded. As discussed above, the Examiner did not identify any description in the Specification that identifies boron as the "only" melting point depressant material or that "nickel-boron" is not, or cannot include, a melting point depressant such as unreacted boron (FF 5). Here, the Specification describes the diffusion of melting point depressant material into the sheath, which may be encouraged by heat treatment, to form "nickel-boron" (FF 3). The Specification, as originally filed, plainly describes the finally-produced consumable insert as having a "distribution of melting point depressant" (FF 3), which would have informed one skilled in the relevant art that "nickel-boron" constitutes or includes the melting point depressant. Again, while the Examiner directs us to Kear, Allnatt, Burke, and Ryan, these references have not been shown to demonstrate that boron is the only suitable melting point depressant. Instead, Kear, for example, suggests that "melting point depressant" can include materials other than boron (Ans. 7; FF 6). Thus, we find no factual basis to uphold the Examiner's finding that the Specification fails to reasonably convey to one skilled in the relevant art that Appellants had possession of a "melting point depressant material comprising nickel-boron," as now recited in appealed claim 1 (FF 4).

III. Rejection of Claims 1-4 as Anticipated by Ryan

Appellants argue the appealed claims together, focusing on claim 1 (Br. 7). Accordingly, we select claim 1 as representative and confine our discussion to this claim. 37 C.F.R. § 41.37(c)(1)(vii).

It is undisputed that, in Ryan's Figure 4, each of the layers defined by the sub-regions in direct contact with the middle region (i.e., the sub-region in direct contact with the middle region but not inclusive of the boronized surface layers) of the assembly contains less boron than the boron-rich middle region (Br. 7; FF 7-9). Appellants' only contention is that the Examiner erred because Ryan discloses the same concentration of boron per unit volume in the assembly at the top- and bottom-facing surfaces as in the middle region of the assembly where the two foils are joined (Br. 7).

Appellants have not identified any description in their Specification, let alone explain, how claim 1 excludes Ryan's regions defined by the facing surfaces. In this case, claim 1 recites "comprising," which opens the claimed consumable insert foil to unrecited regions, and "*proximate* an exterior surface region" (emphasis added), which does not limit the location of the sub-regions in direct contact with the middle region to be coincident with those of the facing surface regions. *In re Baxter*, 656 F.2d 679, 686 (CCPA 1981); *In re Morris*, 127 F.3d at 1054.

For these reasons, Appellants have failed to show reversible error in the Examiner's anticipation rejection.

IV. Rejection of Claims 7-9 and 12 as Unpatentable over Ryan and Sabol

For reasons given by Appellants (Br. 8-9), we agree that the Examiner erred in concluding that one of ordinary skill in the art would have been led to incorporate Sabol's MCrAlY alloy material into Ryan's consumable insert (FF 10). As evidence of the reason to combine the references, the Examiner relied on Sabol's description of good adhesion between a MCrAlY alloy coating and the substrate that it protects (FF 11 and 12). The Examiner, however, failed to demonstrate that a person of ordinary skill in the art would have reasonably expected that the adhesion discussed in Sabol, in the context of protective coatings, would have been sufficient for joining two metal articles, as disclosed in Ryan (FF 7 and 8). *KSR*, 550 U.S. at 418 ("[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.").

Thus, we cannot uphold the Examiner's obviousness conclusion.

V. Rejection of Claims 15-21 as Unpatentable over Ryan and Bampton

We agree with Appellants that the Examiner clearly erred by dismissing disputed claim limitations without properly accounting for them. Accordingly, we must reverse the Examiner's obviousness rejection of claims 15-21.

VI. Rejection of Claim 22 as Unpatentable over Ryan, Bampton, and Sabol

For the same reasons as discussed above with regard to Rejection IV, we find that Appellants have shown that the Examiner erred in concluding that it would have been obvious for one of ordinary skill in the art to incorporate MCrAlY alloy material, as taught by Sabol, into the consumable insert of Ryan.

CONCLUSION

Rejection I

Appellants have shown reversible error in the Examiner's conclusion that one skilled in the relevant art would not be able to ascertain the scope of the claim terms "melting point depressant material comprising nickel-boron," as recited in claim 1.

Rejection II

Appellants have shown reversible error in the Examiner's finding that the disclosure, as originally filed, did not reasonably convey to one skilled in the relevant art that Appellants had possession of the invention now recited in claim 1, including the limitation "the melting point depressant material comprising nickel-boron."

Rejection III

Appellants have not shown error in the Examiner's finding that Ryan describes a consumable insert foil comprising a melting point depressant material "having a concentration that is greater proximate a center region of the consumable insert foil than proximate an exterior surface region of the consumable insert foil," as recited in claim 1.

Rejections IV and VI

Appellants have shown error in the Examiner's obviousness conclusion because the Examiner failed to identify a sufficient reason why one of ordinary skill in the art would have been led to combine Ryan and Sabol .

Rejection V

Appellants have shown error in the Examiner's rejection because it did not properly account for the contested limitations in claims 15, 18, and 19.

DECISION

The Examiner's rejections of:

claims 1-4 under 35 U.S.C. § 112, ¶¶ 1 and 2;

claims 7-9 and 12 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Ryan and Sabol;

claims 15-21 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Ryan and Bampton; and

claim 22 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Ryan, Bampton, and Sabol, are reversed.

The Examiner's rejection of claims 1-4 under 35 U.S.C. § 102(b) as anticipated by Ryan is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

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